



Special Nuclear Materials NOW COMPLETE

Overview

The greatest liability at Rocky Flats has been the potential risk to health and safety posed by the presence of various forms of plutonium and highly enriched uranium (U-235) – known as Special Nuclear Materials (SNM). Rocky Flats, part of the U.S. Department of Energy (DOE) Nuclear Weapons Complex, in 1994 stored approximately 14 tons of plutonium and about 7 tons of highly enriched uranium. Much of this material was stored in temporary packaging since 1989, when the site's 40-year mission to produce components for nuclear weapons was put on hold and never resumed.

Because it emits radiation, SNM can harm humans and the environment. SNM, in certain configurations, is more susceptible to fire or criticality (an uncontrolled nuclear chain reaction that results in a sudden release of large amounts of radiation).

To reduce the risks associated with SNM it is necessary to stabilize the material, that is, put it in a form that reduces the possibility of an accident, and consolidate the material into as few locations as possible. In 1996, DOE agreed in the Rocky Flats Cleanup Agreement (RFCA) to the goal of removing weapons-usable fissile material by 2015. **As of August 2003, Kaiser-Hill Company and the DOE have met that requirement 12 years ahead of schedule.**

SNM is found in predominately three forms at Rocky Flats -- liquids, metals and oxides, and residues. Three major activities, described below, were directed toward the stabilization, consolidation, and shipment of SNM from the site.

Plutonium and Uranium Solutions (Liquid) Stabilization

Liquid stabilization was the highest priority risk reduction activity at Rocky Flats. The probability of accidents occurring with liquids is generally higher than with solids because the liquids can spill, corrode containers and leak, and transfer through skin more readily.

The liquids on site were generated from the recovery and purification process. Scientists used a liquid process to recover and purify plutonium and uranium from impure metals and scrap. This process involved dissolving plutonium-bearing materials in acid, producing a solution in which plutonium was separated from the other dissolved materials. This recovery process originally was performed in Building 771, which was built in 1951, and later in Building 371. Both buildings once contained solutions in tanks, bottles and piping.

From 1995 to 1998, all major plutonium and uranium tanks were drained in buildings 371 and 771 and the bottles were removed and solutions stabilized.

In addition to the solutions described above, pure uranium nitrate solutions were shipped to Rocky Flats in 1965 and used in Building 886 for experiments to develop data for weapons design. During 1996, these solutions (2,700 liters containing 569 kilograms of highly enriched uranium) were bottled in approved shipping containers and transported to the Nuclear Fuel Services facility in Erwin, Tenn.

Plutonium and Highly Enriched Uranium Metals and Oxides Stabilization

Plutonium and uranium metals at Rocky Flats were used to manufacture components for nuclear weapons. The site's primary product was called a pit (also called a trigger), which contains plutonium and is part of a nuclear weapon. Rocky Flats received its plutonium and uranium metals from other DOE facilities.

The metals and oxides were once stored in vaults in different buildings at Rocky Flats. In August 2003, the last of 6,600 kilograms of plutonium metal and 3,200 kilograms of plutonium oxides were stabilized or repackaged, and shipped off site. Stabilization involves opening containers of plutonium metal, brushing off the plutonium oxide (similar to rust), and heating the oxide in a furnace. The heating converts the oxide to a more stable and predictable form for storage. The plutonium metals and oxides were repackaged into 1,895 special stainless steel containers for off-site shipment.

Plutonium metals and oxides were packaged using an semi-automated system to package plutonium into long-term safe configuration for storage. The Plutonium Stabilization and Packaging System (PuSPS) contains furnaces capable of heating up to 5 kilograms of plutonium oxide to a temperature of 1025C for a period of four hours. The purpose of the operation was to reduce the moisture content of the oxides to prevent overpressurization of the final storage container, the double-welded DOE 3013 can. The stainless steel 3013 can is safe for 50-year storage.

Plutonium metals and most oxides were shipped to DOE's Savannah River Site in South Carolina. Some oxides with lower plutonium content underwent reprocessing and will be shipped as waste to the Waste Isolation Pilot Plant near Carlsbad, N.M. The pits required no processing or additional packaging and have been shipped to DOE's Pantex Plant in Texas. The 7 tons of highly enriched uranium was shipped to several locations including Nuclear Fuels Service, and the DOE Oak Ridge Reservation in

Tennessee and the Savannah River Site in South Carolina.

Solid Residue Elimination Program

Residues are by-products of the production process containing amounts of plutonium worth recovering for further use if weapons production had ever resumed at the site. Residues are mostly in the form of production process "leftovers" such as incinerator ash, castings, paper, cloth, plastic, metal, glass, filters and insulation. There were approximately 106,000 kilograms of residues containing about 3,100 kilograms of plutonium.

Residue elimination involved treating and/or repackaging the solid residues to a stable, predictable form. Treatment consisted of drying the residues or heating the residues in a furnace. Heating converts the material to a stable form suitable for long-term disposal. Residue treatment/repackaging was completed in 2002.

Final Disposition

In March 2001, the consolidation of all remaining stored plutonium into Building 371 was completed. Building 371 is the most robust structure at the site. The plutonium remained protected in Building 371 until it was shipped to South Carolina. Shipments of plutonium metals and oxides began in 2002 and the Special Nuclear Materials Shipping Project is now complete. The Plutonium metals and oxides will be stored at the Savannah River Site. The final disposition of this material is currently being considered and may be used in the DOE Mixed Oxide (MOX) Fuel program.

The mission of DOE and Kaiser-Hill is to ensure that the cleanup of Rocky Flats is conducted as safely and quickly as possible. A key element of this mission has been to reduce urgent risks first by stabilizing, then consolidating and shipping the entire inventory of SNM off site. With this mission complete, the site can focus on shipping waste and decommissioning and demolishing the more than 800 structures. Cooperation amongst the DOE receiver sites is critical to achieving the accelerated closure of Rocky Flats.



U.S. Department of Energy

Make It Safe. Clean It Up. Close It Down.



For further information about Rocky Flats

Contact DOE Communication at (303) 966-4546, or Kaiser-Hill Communication at (303) 966-2882
Also, additional information about Rocky Flats is available on the internet at: <http://www.rfets.gov>